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CQCE/BBMP/DM/16/2020-2021

28.09.2020

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Executive Engineer, RR Nagar** Division,BBMP, Bangalore.
Agency	: **Sri.Damodar Manjunath,** Contractor, Bangalore.
Name of Work	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Bituminous Concrete
Date of Testing	28.09.2020

Sl no	Test	1	2	3	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	10.5	9.9	10.7	Combined Flakiness & Elongation index Max 35%
2	Elongation Index	11.6	10.5	11.6	
	Combined Flakiness & Elongation index	22.10	20.40	22.30	

Note:

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Asst. Executive Engineer
Yeshwanthpura Sub-Division
Bruhat Bangalore Mahanagara Palike

For CIVIL QUALITY CONSULTANTS & ENGINEERS

Authorised Signatory

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No: CQCE/BBMP/DM/16/2020-2021

28.09.2020

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: Executive Engineer, RR Nagar Division,BBMP, Bangalore.
Agency	: Sri.Damodar Manjunath, Contractor, Bangalore.
Name of Work	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Bituminous Concrete
Date of Testing	28.09.2020

Sl no	Test	1	2	3	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	9.8	10.2	10.5	Combined Flakiness & Elongation index Max 35%
2	Elongation Index	10.3	11.3	11	
	Combined Flakiness & Elongation index	20.10	21.50	21.50	

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CQCE/BBMP/DM/16/2020-2021

Specific Gravity And Water Absorption Test

28.09.2020

Client	: Executive Engineer, RR Nagar Division, BBMP,Bangalore.
Agency	: Sri.Damodar Manjunath, Contractor, Bangalore.
Name of the Work	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
BIS Code	:IS 2386(Part 3):1963
Type of Mix	Bituminous Concrete
Date of Testing	26.09.2020 to 28.09.2020

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2021	2020	2022	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1266	1265	1267	
4	Weight of saturated surface dry aggregate in air	W_3 g	2014	2016	2018	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	751	751	
6	Weight of oven dried aggregate	W_4 g	2005	2006	2009	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.680	2.671	2.675	2.676
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.713	2.707	2.708	2.709
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.45%	0.50%	0.45%	0.47%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%(MORTH table 500.16)

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Aggregate Gradation Test

IS : 2386 Part I

28.09.2020

	: Executive Engineer, RR Nagar Division,BBMP,Bangalore.
	: Sri.Damodar Manjunath, Contractor, Bangalore.
e of the Work	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
s Code	:IS 2386(Part 1):1963
ample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	28.09.2020

Total Weight of Sample: 5000 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	405	8.10	8.10	91.90	90 - 100	
9.5	479	9.58	17.68	82.32	70 - 88	
4.75	629	12.58	30.26	69.74	53 - 71	
2.36	698	13.96	44.22	55.78	42 - 58	
1.18	536	10.72	54.94	45.06	34 - 48	
0.600	546	10.92	65.86	34.14	26 - 38	
0.300	498	9.96	75.82	24.18	18 - 28	
0.150	336	6.72	82.54	17.46	12 - 20	
0.075	475	9.50	92.04	7.96	4 - 10	

Total Weight of Sample: 5000 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	695	13.90	13.90	86.10	90 - 100	
9.5	557	11.14	25.04	74.96	70 - 88	
4.75	695	13.90	38.94	61.06	53 - 71	
2.36	528	10.56	49.50	50.50	42 - 58	
1.18	579	11.58	61.08	38.92	34 - 48	
0.600	563	11.26	72.34	27.66	26 - 38	
0.300	429	8.58	80.92	19.08	18 - 28	
0.150	265	5.30	86.22	13.78	12 - 20	
0.075	269	5.38	91.60	8.40	4 - 10	

Asst. Executive Engineer
Yeshwanthapura Sub Division
Bruhat Bangalore Mahanagara Palike

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Aggregate Gradation Test
IS : 2386 Part I

28.09.2020

	: Executive Engineer, RR Nagar Division,BBMP,Bangalore.
	: Sri.Damodar Manjunath, Contractor, Bangalore.
of the Work	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
Code	:IS 2386(Part 1):1963
mple I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	28.09.2020

Total Weight of Sample: 5000 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	416	8.32	8.32	91.68	90 - 100	
9.5	482	9.64	17.96	82.04	70 - 88	
4.75	635	12.70	30.66	69.34	53 - 71	
2.36	658	13.16	43.82	56.18	42 - 58	
1.18	545	10.90	54.72	45.28	34 - 48	
0.600	528	10.56	65.28	34.72	26 - 38	
0.300	475	9.50	74.78	25.22	18 - 28	
0.150	335	6.70	81.48	18.52	12 - 20	
0.075	469	9.38	90.86	9.14	4 - 10	

Total Weight of Sample: 5000 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	658	13.16	13.16	86.84	90 - 100	
9.5	559	11.18	24.34	75.66	70 - 88	
4.75	678	13.56	37.90	62.10	53 - 71	
2.36	539	10.78	48.68	51.32	42 - 58	
1.18	569	11.38	60.06	39.94	34 - 48	
0.600	578	11.56	71.62	28.38	26 - 38	
0.300	465	9.30	80.92	19.08	18 - 28	
0.150	265	5.30	86.22	13.78	12 - 20	
0.075	315	6.30	92.52	7.48	4 - 10	

Asst. Executive Engineer
Yeshwanthpura Sub Division
Bruhat Bangalore Mahanagara Palike

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Job No.: CQCE/BBMP/DM/16/2020-2021 Date: 29.09.2020

TEST REPORT ON STABILITY OF MIX

Client	:	: Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency	:	: Sri.Damodar Manjunath, Contractor, Bangalore.
Name of the Work	:	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	29.09.2020

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.65	10.39	9 Kn (min)
2	Marshal flow, mm	3.46	2.74	2 – 4
3	Percent air voids in Mineral Aggregate	13.42	14.25	13 – 15
4	Voids in Compacted Mix	3.53	4.28	3 – 6
5	Percent Voids filled with Bitumen	66.28	69.42	65 - 75
6	Density, g/cc	2.28	2.27	--

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Job No.: CQCE/BBMP/DM/16/2020-2021 Date: 29.09.2020

TEST REPORT ON STABILITY OF MIX

Client	:	**: Executive Engineer, RR Nagar Division, BBMP,Bangalore.**
Agency	:	**: Sri.Damodar Manjunath, Contractor, Bangalore.**
Name of the Work	:	: Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	29.09.2020

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.74	10.12	9 Kn (min)
2	Marshal flow, mm	3.26	2.79	2 – 4
3	Percent air voids in Mineral Aggregate	13.42	14.39	13 – 15
4	Voids in Compacted Mix	3.65	4.29	3 – 6
5	Percent Voids filled with Bitumen	66.18	69.36	65 - 75
6	Density, g/cc	2.27	2.26	--

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Job No.: CQCE/BBMP/DM/16/2020-2021 Date: 06.08.2020

TEST REPORT ON STABILITY OF MIX

Client	:	: Executive Engineer, RR Nagar Division, BBMP,Bangalore.
Agency	:	: Sri.Damodar Manjunath, Contractor, Bangalore.
Name of the Work	:	: Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	06.08.2020

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.71	10.15	9 Kn (min)
2	Marshal flow, mm	3.32	2.96	2 – 4
3	Percent air voids in Mineral Aggregate	13.28	14.13	13 – 15
4	Voids in Compacted Mix	3.74	4.41	3 – 6
5	Percent Voids filled with Bitumen	66.65	69.85	65 - 75
6	Density, g/cc	2.28	2.27	--

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CQCE/BBMP/DM/16/2020-2021

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Executive Engineer, RR Nagar Division,BBMP, Bangalore.
AGENCY	: Sri.Damodar Manjunath, Contractor, Bangalore.
NAME OF THE WORK	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	29.09.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.9	472.6
3. Weight of Asphalt and Mineral matter Extracted, g	27.1	27.4
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.1	27.4
7. Bitumen content in %	5.42	5.48
8. Average	5.45	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	13.5	13.5	2.9	97.1	90 - 100
9.5	63.5	77	16.3	83.7	70 - 88
4.75	98.6	175.6	37.1	62.9	53 - 71
2.36	46.5	222.1	47.0	53.0	42 - 58
1.18	41.9	264	55.8	44.2	34 - 48
0.600	52.8	316.8	67.0	33.0	26 - 38
0.300	42.8	359.6	76.0	24.0	18 - 28
0.150	36.5	396.1	83.8	16.2	12 - 20
0.075	48.2	444.3	94.0	6.0	4 - 10

SIEVE SIZE mm	Test 2 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	13.5	13.5	2.9	97.1	90 - 100
9.5	66.9	80.4	17.0	83.0	70 - 88
4.75	89.6	170	36.0	64.0	53 - 71
2.36	47.5	217.5	46.0	54.0	42 - 58
1.18	43.1	260.6	55.1	44.9	34 - 48
0.600	52.6	313.2	66.3	33.7	26 - 38
0.300	42.9	356.1	75.3	24.7	18 - 28
0.150	33.5	389.6	82.4	17.6	12 - 20
0.075	48.6	438.2	92.7	7.3	4 - 10

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BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Executive Engineer, RR Nagar Division,BBMP, Bangalore.
AGENCY	: Sri.Damodar Manjunath, Contractor, Bangalore.
NAME OF THE WORK	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	29.09.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.4	472.7
3. Weight of Asphalt and Mineral matter Extracted, g	27.6	27.3
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.6	27.3
7. Bitumen content in %	5.52	5.46
8. Average	5.49	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	12.9	12.9	2.7	97.3	90 - 100
9.5	62.8	75.7	16.0	84.0	70 - 88
4.75	96.8	172.5	36.5	63.5	53 - 71
2.36	45.7	218.2	46.2	53.8	42 - 58
1.18	42.3	260.5	55.1	44.9	34 - 48
0.600	53.1	313.6	66.4	33.6	26 - 38
0.300	41.8	355.4	75.2	24.8	18 - 28
0.150	38.9	394.3	83.5	16.5	12 - 20
0.075	47.5	441.8	93.5	6.5	4 - 10

SIEVE SIZE mm	Test 2 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	12.6	12.6	2.7	97.3	90 - 100
9.5	66.3	78.9	16.7	83.3	70 - 88
4.75	85.9	164.8	34.9	65.1	53 - 71
2.36	48.5	213.3	45.1	54.9	42 - 58
1.18	42.5	255.8	54.1	45.9	34 - 48
0.600	53.2	309	65.4	34.6	26 - 38
0.300	41.8	350.8	74.2	25.8	18 - 28
0.150	32.6	383.4	81.1	18.9	12 - 20
0.075	52.6	436	92.2	7.8	4 - 10

Note:

Asst. Executive Engineer

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CQCE/BBMP/DM/16/2020-2021

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

29.09.2020

CLIENT	: Executive Engineer, RR Nagar Division,BBMP, Bangalore.
AGENCY	: Sri.Damodar Manjunath, Contractor, Bangalore.
NAME OF THE WORK	:Comprehensive Development of roads and drains in ward no. 16, Rajarajeshwarinagara Assembly Constituency under Package-2019-20 RRN-DIV-(01), BBMP, Bangalore
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	29.09.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.5	472.2
3. Weight of Asphalt and Mineral matter Extracted, g	27.5	27.8
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.5	27.8
7. Bitumen content in %	5.50	5.56
8. Average	5.53	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	13.2	13.2	2.8	97.2	90 - 100
9.5	63.8	77	16.3	83.7	70 - 88
4.75	95.7	172.7	36.6	63.4	53 - 71
2.36	46.2	218.9	46.3	53.7	42 - 58
1.18	43.7	262.6	55.6	44.4	34 - 48
0.600	51.4	314	66.5	33.5	26 - 38
0.300	42.6	356.6	75.5	24.5	18 - 28
0.150	37.9	394.5	83.5	16.5	12 - 20
0.075	48.6	443.1	93.8	6.2	4 - 10

SIEVE SIZE mm	Test 2 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	13.5	13.5	2.9	97.1	90 - 100
9.5	63.9	77.4	16.4	83.6	70 - 88
4.75	89.6	167	35.4	64.6	53 - 71
2.36	51.2	218.2	46.2	53.8	42 - 58
1.18	43.6	261.8	55.4	44.6	34 - 48
0.600	52.8	314.6	66.6	33.4	26 - 38
0.300	42.7	357.3	75.7	24.3	18 - 28
0.150	33.6	390.9	82.8	17.2	12 - 20
0.075	51.9	442.8	93.8	6.2	4 - 10

Note:

Asst. Executive Engineer
Yeshwanthpura Sub-Division

For CIVIL QUALITY CONSULTANTS & ENGINEERS

Authorised Signatory

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